Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora, IL 60506-1000

Application For SIR Placement at Fermi National Accelerator Laboratory (FNAL)

(provide two recommendations – see rec form; please use a computer to complete this application legibly)

Name: Lakshmanan (Last) Aakash (First) _____ (Middle) Date: 3/5/2015 (month / day / year)

Home Address: 828 Teasel Lane (Number and Street)

Aurora (City) IL (State) 60504 (Zip Code) Home Telephone: (630)-202-3957 (include area code)

Person to be notified in an emergency: Subhapriya Lakshmanan

Telephone (office hours): (630)-202-3957 (include area code) Telephone (other hours): (630)-202-3957 (include area code)

Student Cell Phone: (630)-947-2820 Year of Graduation: 2017

Suggested FNAL Advisor: _____

Gender: ■ male ☐ female Age: 15 Country of Citizenship*: USA

*Citizens other than from the United States must complete the following information:

Permanent Resident: ☐ Yes ☐ No

Place of Birth: Elkgrove Village, IL, USA (City, State, Country)

Passport No.: _____ Expiration Date: _____

All non-U.S. citizens must present their original, unexpired foreign passport on the first day of the program. Photocopies are not acceptable. Depending on your circumstances, you also must present:

- Form I-94 Arrival Departure Card that shows lawful admission to the U.S. and the end date of your "authorized stay", **PLUS**:
  - Form I-797 Notice of Action approving H-4, O-3, TD, E-3 or other nonimmigrant (temporary) visa status in the U.S. , OR
  - Form DS-2019 Certificate of Eligibility for J-2 status, OR
  - Form I-20 showing F-2 status, **OR**
- Greencard (Alien Registration Card, or I-551 Card) showing grant of lawful permanent resident status.

Describe your skills, abilities, proficiencies; please be honest.

Highest Math Level/Skill: BC Calculus 2 i.e. Introductory Integration and Application

Skill with Statistics: Introductory Descriptive and Inferential Statistics (ANOVAs, t-tests, etc.)

Science Classes: Introductory Chemistry, Biology, Physics but I have knowledge of calculus-based mechanics and e&m

Describe Your Laboratory Skills: Titration and pipetting

Prior Research (SIR) Experience (include advisor name/location): None

Computer Proficiency: Please indicate your skill level for each of the below.

	none	introductory	intermediate	advanced
Basic	X			
C/C++		X		
Fortran	X			
Java	X			
Other Languages(list)	X			
Mathematica		X		
Matlab	X			
Other Programs (list)	X			
Unix(Linux)	X			
Windows			X	
Mac		X		
Other OS (list)		x		

Rank Your Interests (Do not rank any area that you would not be willing to pursue an investigation in.)

___Accelerator Component Testing, Theory and Design
___Astrophysics Data Analysis, Detector Development, Theory
___Computer Networking, Computing for Analysis, Data Analysis of Experiments, Computer Simulation and Modeling
___Detector Design and Testing
___Electronics Design and Testing
___Instrumentation and Diagnostics
___Radiofrequency (RF) Systems
_5__Magnet Systems
_4__Mechanical Design and Development
_3__Particle Physics Phenomenology
_1__Particle Physics Theory
_2__Superconducting Technology

Attach an application that includes the following items:

- Academic honors and awards that you have received. Please limit to ten or less honors/awards that you feel are the most significant.
- Extracurricular activities, interests, and any leadership role(s). Please limit to ten or less activities/interests that you feel are the most significant.
- Explain why research at FNAL would be a benefit to you and what you expect from participation in an investigation at FNAL. (Limit your answer to 250 words or less.)
- What would you tell a FNAL scientist about yourself so that you would be selected to work with her or him? (Limit your answer to 250 words or less.)
- Explain one exceptional experience you had with STEM in the last year. (Limit your answer to 250 words or less.)

Placement at FNAL also requires:

- Fermi Lab Visitor ID Form (form attached)
- Proof of Medical Coverage (form attached)
- Work Permit (required of students who are under 16 years of age)
- Documentation of Immigration Status (see first page)
- Authorization for Issuance of an ID Card (form attached)
- Student Registration (form attached)

- Note that some information is repeated on the attached forms, which will be filed with the appropriate offices at FNAL once a student has a specific placement.

I understand that by submitting this application for placement at the **Fermi National Accelerator Laboratory** *I may not apply for or seek other SIR opportunities until a decision has been made about this application. Placement for SIR at FNAL is not guaranteed by submission of this application.*

___3-22-2015__
Signature of Parent/Guardian Date

_____3-22-2015_____
Signature of Applicant Date

Essay 1:

I feel that my passion for science stretches past the limitations of what I can learn in school. Fermi Lab specializes in particle physics, an often-ignored science in most high school's curriculum, including in my own. This makes investigation at Fermi Lab a very novel experience. I greatly look forward to learning the phenomenology, theory, and especially mathematics behind particle physics.

Connecting mathematics and physics helps me see both subjects in a new light. The growth in one almost always results in the growth of the other. Vague and seemingly useless concepts like cross product only seem to make sense when learning concepts like torque in rotational mechanics. Like this, I hope to learn advanced particle physics that will bring to life previously obscure mathematical concepts. Similarly, I wish to learn new methods of mathematical modeling that result from particle physics. In Fermi Lab, I hope to learn various physical concepts that can supplement my understanding of mathematics.

Lab experience is also vital to my growth as a STEM student. By participating in this investigation, I will learn how to conduct experimental analysis and design. The accelerators and complex machines that Fermi Lab has access to cannot be used anywhere else and thus makes it that much more useful to my growth as a scientist. From working at Fermi Lab, I would establish a strong basis to work towards my goals of one day being a researcher.

Essay 2:

My passion has always been mathematics. Because of this, I work very hard in any rigorous mathematical inquiry. However, my true interest is in physics because I love the idea of applying such abstract concepts into the real physical world. A key feature of who I am is autonomy, and throughout my high school career I have nurtured this part of myself. I have taught myself differential and integral calculus as well as calculus-based mechanics and electricity/magnetism which has resulted in me being fairly proficient in the field. I'm a quick learner and eager to fill gaps in my knowledge on my own as they arise during the inquiry. I will always surpass what is expected of me, and my passion will fuel research on my own time. With a solid understanding of biology and chemistry as well as descriptive and inferential statistics such as ANOVAs, t-tests, etc., I would say I am very prepared for this investigation.

Particle physics is a field that involves both creative and mathematical thinking: two things that I enjoy profoundly. I have written short papers on mathematical theorems that I have created on various occasions; I could never separate innovation in math from who I am. More than experimenting in the field, I love the idea of postulating and predicting the outcomes of phenomena. In my opinion, I have both the ability and the knowledge to participate in an exceptional investigation at the Fermi National Accelerator.

Essay 3:

Arriving at the Illinois Mathematics and Science Academy, I knew that I would be surrounded by peers who are extremely proficient in mathematics and science and that competing against these students would be a completely novel experience. The most significant experience of sophomore year was math team, a series of various competitions and rigorous tryouts. When arriving at the first tryout, the pressure was building up and when I finally got my results, I had an interesting mixture of both shock and pride in myself. Tentatively being placed 6^{th} place on the team, I knew that there was potential to succeed but a lot of work to be done as well. For some weeks, every tryout started to yield a similar result but I studied more rigorously striving to get pas proficient in competition mathematics as I could. Each competition, I could see myself improving along with my team. After a little bit, I could see a significant improvement.

My peers had similar aspirations and I not only competed against them, but I also collaborated with them. The whole experience was a series of competing against each other, collaborating to help each other out, and then repeating the process. Math team had showed me the wonders of collaboration in STEM, the true meaning of competition, and how to really work hard. I know math team was one of the highlights of my sophomore year in the Illinois Mathematics and Science Academy.

Academic Honors and Awards:

1. 2nd place North Suburban Mathematics League of Illinois Meet #3
2. Best of Category IJAS State Science Fair
3. First Lego League Regional Robotics Award Team Captain
4. First Lego League State Qualifier Team Captain
5. Honor Roll Metea Valley High School 2014-2015

Extracurricular activities, Interests, and Leadership Roles:

1. Math Team
2. Mu Alpha Theta
3. Indian Student Association
4. Tennis
5. First Lego League Team Captain
6. Quarknet
7. American Mathematics Competition
8. Robotics
9. Student Ambassador
10. Scholastic Bowl

Student Name: LAKSHMANAN, Aakash
Date of Birth: 08/21/1999
Entry Date: 08/14/2014

Illinois Mathematics and Science Academy
School Code:140177

		Sem1	Sem2	Credit
Y14-15				
Grade 10	Literary Explorations I	B		0.50
Grade 10	Literary Explorations II		B	0.50
Grade 10	Concert Band	A	A	1.00
Grade 10	American Studies	B	B	1.00
Grade 10	Mathematical Investigations IV	A		0.50
Grade 10	BC Calculus II		B	0.50
Grade 10	Scientific Inquiries - Chemistry	B		0.50
Grade 10	Scientific Inquiries - Physics	A-		0.50
Grade 10	Scientific Inquiries - Biology		B	0.50
Grade 10	Methods in Scientific Inquiry		B	0.50
Grade 10	Moving and Learning	B	B	0.50
Grade 10	Spanish II	B	A-	1.00

Diane M Stegmeyer

Registrar 06/10/2015

Academic Program
All IMSA courses are college preparatory.

Explanation of Grades

A	Exceeds course requirements
B	Meets course requirements
C	Needs improvement
D	Does not meet course requirements; no Academy credit awarded
I	Incomplete, course requirements not completed when grades were issued
WF	Withdrawn from course with failing grade; no Academy credit awarded
W	Withdrawn from course; no Academy credit awarded

Pass/Fail Options

P+	Exceeds course requirements (Pass with Distinction, used only in Independent Study and Student Inquiry and Research courses)
P	Meets course requirements; Academy credit may/may not be awarded depending on course grading criteria
F	Does not meet course requirements for course taken pass/fail; no Academy credit awarded

Intersession (one week non-credit course)

S	Satisfactory completion of requirements
U	Unsatisfactory completion of requirements

GPA/Class Ranking Policy
In light of IMSA's selective admission process and in order to promote collaborative exploration and discovery, the Academy does not compute grade point averages and class rankings.

Standardized Test Scores
Standardized test scores are provided by the student.

Student Inquiry and Research
(Inquiry and Mentorship) includes on-campus and off-campus experiences in which students plan, investigate, analyze, and communicate in-depth scholarly investigation, either guided or directed, by scientists, scholars, and/or educators.

TALENT (Total Applied Learning for Entrepreneurs)
Is a program that promotes entrepreneurial applied science and technology.

Federal and State Constitution Requirements
Are fulfilled with successful completion of American Studies.

Physical Education Requirement
Is fulfilled with successful completion (pass) of physical education or wellness.

Notice to persons or agencies receiving student records:
Section 438(b)(4)(B) of U.S. Public Law 93-380 requires that this pupil record information be transferred to you only on condition that you will not permit any other party to have access to it without the written consent of a parent/guardian or eligible student.

IMSA
Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora IL 60506
Phone 630-907-5066 Fax 630-907-5922

Illinois Mathematics and Science Academy

The World's Leading Teaching and Learning Laboratory for Imagination and Inquiry

Student Inquiry and Research

Recommendation Form

Student Name Aakash Lakshmanan graduation year 2017

Recommender Peter Dong pdong@imsa.edu

(name) (email)

Recommender: The student listed above wishes to participate in the Student Inquiry and Research (SIR) Program. SIR advisors are frequently requesting additional information so your assistance is needed in recommending and evaluating students. This completed form, as a pdf file, may be sent to off-campus individuals to assist with best placement of students.

1. Please rate the student on each of the following criteria, with 5 being highest and 1 being lowest, based on your experiences with IMSA students.

Criteria	5	4	3	2	1	No basis for judgment
Motivation for the investigation		X				
Intellectual potential		X				
Ability to analyze/problem solve		X				
Teamwork skills			X			
Perseverance		X				
Maturity				X		
Works independently			X			
Communication skills		X				
Integrity		X				
Overall judgment		X				

Please comment on the preparedness of the student to participate in an independent investigation.

Aakash is smart and quick-thinking, and he has a good grasp of basic concepts of statistics and of scientific investigation. In general, I would expect him to do a good job with independent research. The reason for some of the low marks above is that he had some difficulty thinking through exactly what a chosen course of action entailed, and had perhaps a bit too much faith in what the Internet could tell him. He also had some difficulty working with his lab partner that I don't think he handled very well.

At the same time, Aakash is still growing, and I don't expect him to really have a problem with independent research. He definitely has the ability to do independent research and he is generally good about staying on task. Teamwork is harder for him—he's more than a bit stubborn—but I think he is learning that as well.

Is there anything else that you feel a potential advisor should know about this student?

Illinois Mathematics and Science Academy

The World's Leading Teaching and Learning Laboratory for Imagination and Inquiry

Student Inquiry and Research
Recommendation Form

Student Name Aakash Lakshmanan graduation year 2017

Recommender Dr. Carlson mcarlson@imsa.edu
(name) (email)

Recommender: The student listed above wishes to participate in the Student Inquiry and Research (SIR) Program. SIR advisors are frequently requesting additional information so your assistance is needed in recommending and evaluating students. This completed form, as a pdf file, may be sent to off-campus individuals to assist with best placement of students.

1. Please rate the student on each of the following criteria, with 5 being highest and 1 being lowest, based on your experiences with IMSA students.

Criteria	5	4	3	2	1	No basis for judgment
Motivation for the investigation	X					
Intellectual potential	x					
Ability to analyze/problem solve		X				
Teamwork skills	X					
Perseverance	X					
Maturity		X				
Works independently	X					
Communication skills	X					
Integrity	X					
Overall judgment	X					

Please comment on the preparedness of the student to participate in an independent investigation.
He was a very good, proactive student in sophomore introductory physics. He only had trouble with the most difficult, integrative problems, but he did seek help.

Is there anything else that you feel a potential advisor should know about this student?
No.